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USA Wins International Physics Olympiad

Steven Gubser of Cherry Creek High School in Colorado was the winner of the XX International Physics Olympiad held in Warsaw, Poland, in late July. His total of 46 1/3 points out of a possible 50 placed him at the top of the 150 competitors from 30 countries. Second place was won by a Hungarian with 45 1/2 points with third place going to a Romanian student with 45 points.

In total, ten gold medals were awarded to competitors from nine different countries with West Germany winning two. There were 26 silver medals, and 33 bronze medals awarded at the competition.

Jason Jacobs and Derrick Bass won bronze medals for the United States; James Sarvis received an honorable mention with Jessica Millar falling just short of an honorable mention. Jessica also received recognition as the youngest competitor at the Olympiad (Jessica will celebrate her 16th birthday in December). In addition to the medals and diplomas, the gold medal winners received a multimeter, the silver medal winners were given binoculars, and the bronze medal winners were presented a power drill. Steven also received a very nice microscope for achieving the top score in the competition. We were pleased that Dr. Garry Waxmonsky, science attache to the U.S. embassy in Warsaw, was able to attend the awards ceremony held at Warsaw University on July 23.

The five competing members of the U.S. team and their coaches had a marvelous time in Poland. We traveled to Poland a couple of days early to compensate for jet lag. We spent these days completing a physics lab and solving some theoretical problems while still leaving time for exploring the Old Town and New Town (founded at the turn of the 14th century!) areas of Warsaw. Shopping was great as the officially sanctioned unofficial exchange rate was more than 5000 zloty per U.S. dollar compared to the official rate of 820 zloty per U.S. dollar. Excellent dinners could be obtained for only a couple of dollars per person and ice cream cones were only 5 cents.

The coaches and students were housed in separate boarding schools a short ten-minute walk apart. The Polish organizing committee arranged an organ recital in the oldest church in Warsaw, a concert, tours, and special meals for us. The students were also treated to a two-day excursion to northern Poland while the examinations were being graded and discussed.

The Olympiad competition consists of a five-hour theoretical examination that accounts for 60 percent of the score and a 5-hour experimental examination that counts for 40 percent. The theoretical examination consisted of three very difficult problems. As an example, the second problem was:

Three known masses m_1, m_2, and m_3 located at non-collinear points P_1, P_2, and P_3 interact with each other through their mutual gravitational forces only; they do not interact with any other bodies. Let σ denote the axis through the center of mass of the points P_1, P_2, and P_3 and perpendicular to the triangle $P_1P_2P_3$.

What relations should be satisfied by the distances $P_1P_2 = a_{12}$, $P_2P_3 = a_{23}$, $P_1P_3 = a_{13}$ and the angular velocity ω of the system (with respect to the axis σ) to allow the shape of the triangle $P_1P_2P_3$ to remain unchanged during the motion of the system, i.e., under what conditions will the system rotate around the axis σ as a rigid body?

The first problem dealt with the boiling of two liquids that do not dissolve in each other while the last one was concerned with the properties of an electron microscope. The experimental problem required the students to measure the velocity of sound in liquids using piezoelectric crystals. The texts and solutions to these problems will be published later.

The selection of the 1989 U.S. Physics Team began in November with the mailing of information and application forms to high schools across the nation. The preliminary test was given to about 600 applicants during the first part of February. A second, harder exam was given in March to the top 60 students rated on the first exam. On the basis of these two exams and academic files provided by the teachers, we selected the 20 members of the U.S. Physics Team. All nominated students and their teachers received certificates from AAPT commending them for their achievements in the study and teaching of physics.

The team members were invited to attend a week-long training camp during the last week in May at the University of Maryland. For five, long days the students listened to lectures, worked physics problems, and took examinations. We were joined in the theoretical training by Avi Hauser, whose time was contributed by AT&T Laboratories, and Jack Wilson, AAPT Executive Officer. The laboratory portion of the training was conducted by Dan Hatten and Jill Goldberg, graduate students at the University of Maryland. The students also heard special guest lectures on areas of current research. The herculean task of coordinating all activities was performed by Ellen Layman.

On the sixth day we journeyed to downtown Washington for visits with Secretary of Education Cavazos and Vice President Quayle and some time in the Air and Space Museum. That night IBM hosted a special dinner on the waterfront and provided each team member with a signed copy of *Fractal Geometry of Nature* by Mandelbrot. Earlier each team member received an HP 28S calculator from

Hewlett–Packard and copies of assorted texts from Addison–Wesley, Worth, Norton, Allyn & Bacon, and Wiley Publishers.

The five members who were chosen to represent the U.S. Physics Team were sent home for 6 weeks with 50 Olympiad-type problems to solve. Most of these students received help from physics teachers that was crucial to the success of the team. We would like to thank James Nearing and Bill Pardo from Miami University for helping Derrick Bass; Hugh Richards of the University of Wisconsin for helping Jessica Millar; John Melone of Thomas Jefferson High School of Science and Technology for helping James Sarvis; and Al Bartlett, Neil Mackie, John Taylor, Merle Ware, and Jerry Leigh of the University of Colorado for helping Steven Gubser. This college-high school interaction is an additional benefit of the Olympiad program.

Funding for the U.S. Physics Team is organized by the American Institute of Physics. Sponsors of the 1989 U.S. Physics Team include the following, giving $5,000 or more: American Association of Physics Teachers, American Institute of Physics, American Physical Society, AT&T Foundation, Eastman Kodak Company, Ford Motor Company, Hewlett–Packard, IBM, Office of Naval Research, and Xerox. Sponsors and contributors giving less than $5,000 were: Addison–Wesley Publishing Company, Allyn & Bacon Corporation, American Astronomical Society, American Association of Physicists in Medicine, American Crystallographic Association, Acoustical Society of America, American Association for the Advancement of Science, International Society of Optical Engineering, Belcore–Bell Communications, BP Research International, COMSAT Satellite Corporation, GTE Laboratories, William Lehrfeld, W.W. Norton, Phillips Petroleum, Schlumberger–Doll Research, University of Maryland, Westinghouse Corporation, John Wiley & Sons, and Worth Publishers, Inc.

The XXI International Physics Olympiad will be July 5–13, 1990, in Groningen, Holland.. Teachers who have students who would like to compete for a position on the U.S. Physics Team and who have not received an invitation by Thanksgiving should write to: Ellen Layman, AAPT, Department of Physics, University of Maryland, College Park, MD 20742, for an application and sample test.

–Arthur Eisenkraft,
Fox Lane High School

– Larry D. Kirkpatrick,
Montana State University

1989 U.S. Physics Team Members and Their Teachers

Derrick Bass (Bronze Medal, Team member representing U.S. in Poland), Miami Beach, FL, North Miami Beach Sr. High School, Rina Roychowdhury (teacher)

Daniel Cory, Chapel Hill, NC, North Carolina School of Science and Math, Charles Britton (teacher)

Geoffrey Dunbar, Cleveland Heights, OH, University School, Mark Carle (teacher)

Christopher Green, Arlington Heights, IL, Buffalo Grove High School, Saulius V. Ploplys (teacher)

Steven Grantz, Philadelphia, PA, Central High School, Joel M. Simon (teacher)

Steven Gubser (Gold Medal, Team member representing U.S. in Poland), Englewood, CO, Cherry Creek High School, Patrick L. Ryan (teacher)

Jonathan Higa, Honolulu, HI, Iolani School, Carey S. Inouye (teacher)

Jason Jacobs (Bronze Medal, Team member representing U.S. in Poland), Baldwin, NY, Baldwin Senior High School, Dominick J. Capozzi (teacher)

Thouls R. Jones, Kearns, UT, Olympus High School, David G. Rettie (teacher)

Raphel Lehrer, Highland Park, NJ, Highland Park High School, Eileen G. Southgate (teacher)

Daniel Lieberman, Howard Beach, NY, Hunter College High School, Laurence Borten (teacher)

Jan D. Mayer, Raleigh, NC, Enloe High School, Elizabeth D. Woolard (teacher)

Jessica L. Millar (Team member representing U.S. in Poland), Madison, WI, West High School, W. Haeberli (teacher, professor at University of Wisconsin–Madison)

Mark A. Moyar, Shaker Heights, OH, Hawken School, Robert H. Shurtz (teacher)

Jon Pelletier, Braintree, MA, Braintree High School, Walter E. Engstrom (teacher)

James P. Sarvis (Honorable Mention, Team member representing U.S. in Poland), Springfield, VA, Thomas Jefferson High School, John I. Melona, Jr. (teacher)

Joe Y. Tien, Irvine, CA, Woodbridge High School, Cecilia Y. Kiang (teacher)

John Vachtsevanos, Marietta, GA, Sprayberry High School, Joan P. Clayton (teacher)

Jennifer J. Yeh, West Hills, CA, North Hollywood High School, Donald Sparks (teacher)

Monib A.T. Zirvi, Fair Lawn, NJ, FairLawn High School, Herbert S. Verter (teacher)